VIRGINIA AGRICULTURAL COUNCIL PREPROPOSAL FORM

Title: Enhancing Embryonic Survival in Cattle Grazing Endophyte-infected Tall Fescue

The discovery and incorporation of key reproductive technologies has greatly improved our ability to breed cows to genetically superior sires, thus enhancing profitability and sustainability. However, early pregnancy losses continue to limit these genetic and economic gains. This is most severe in lactating dairy cows, where between 25 and 50% of pregnancies fail during the first month of gestation. Beef cattle also suffer pregnancy losses, and their rates are estimated at 10 to 30%. Adverse environment factors underlie a majority of these pregnancy failures. Tall fescue endophyte toxicity is one prominent adverse condition in Virginia. Pregnancy failures are more prominent in cattle grazing tall fescue infected with endophyte. Recent work has estimated that a viable pregnancy adds $500 of additional value to dairy cattle and $625 to beef cattle. Based on these values, approximately $40 to $60 million in unrealized income exists in Virginia because of failed pregnancies retention and repeated breeding.

We hypothesize that promoting placental development will encourage positive interactions between the placenta and maternal system, and this will ultimately improve pregnancy retention in cattle grazing endophyte-infected fescue. This laboratory used *in vitro* embryo production procedures to identify a set of uterine factors that promote early placental development. The goals of this proposal are to 1) determine if supplementing embryos with these uterine factors prior to embryo transfer will promote placental health and fetal development, and 2) examine if the transfer of embryos is advantageous for cattle grazing endophyte-infected fescue. Mature beef cows will be maintained on endophyte-infected fescue (Kentland Farm, Blacksburg). Cows will either be bred by artificial insemination or will receive a single *in vitro*-produced embryo that will be treated or not treated with uterine factors prior to transfer. Placental and embryonic/fetal health and development will be examined in pregnant cows. Placental activity will be examined with two different blood-based tests (interferon-stimulated factors & pregnancy-associated glycoproteins). Embryonic (before day 42) and fetal (after day 42) development will be examined by transrectal ultrasonography. At day 60 of gestation, pregnancies will be terminated and cows will be re-used after a brief recovery period. This experimental plan will allow us to gather quantitative outcomes of pregnancy over a short period of time and to accumulate sufficient animal numbers for statistical analyses. In the last replicate of the study, pregnancies will not be aborted, but rather will be maintained to term to provide an initial assessment of how the uterine factors impact fetal size at term.

To conclude, this work will provide novel insights into how early embryonic and placental development may be manipulated to improve pregnancy retention when cattle are grazing endophyte-infected fescue.

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DURATION (years) one____two__X___
BUDGET (yr. one) __$7,000_____(total)___$10,000_____
***One pre-proposal per PI please**

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